



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/519,981	01/03/2005	Etsuo Fujita	500.44577X00	3206
20457	7590	02/22/2008		
ANTONELLI, TERRY, STOUT & KRAUS, LLP			EXAMINER	
1300 NORTH SEVENTEENTH STREET				ROE, JESSEE RANDALL
SUITE 1800			ART UNIT	PAPER NUMBER
ARLINGTON, VA 22209-3873			1793	
			MAIL DATE	DELIVERY MODE
			02/22/2008	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/519,981	FUJITA ET AL.	
	Examiner	Art Unit	
	Jessee Roe	1793	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1) Responsive to communication(s) filed on 30 November 2007.

2a) This action is **FINAL**. 2b) This action is non-final.

3) Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4) Claim(s) 1-4 and 6-21 is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5) Claim(s) _____ is/are allowed.

6) Claim(s) 1-4 and 6-21 is/are rejected.

7) Claim(s) _____ is/are objected to.

8) Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9) The specification is objected to by the Examiner.

10) The drawing(s) filed on _____ is/are: a) accepted or b) objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11) The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12) Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a) All b) Some * c) None of:

- Certified copies of the priority documents have been received.
- Certified copies of the priority documents have been received in Application No. _____.
- Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) Notice of References Cited (PTO-892)

2) Notice of Draftsperson's Patent Drawing Review (PTO-948)

3) Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date _____.

4) Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____.

5) Notice of Informal Patent Application

6) Other: _____.

DETAILED ACTION

Status of the Claims

Claims 1-4 and 6-21 are pending wherein claims 1-3 and 11-12 are amended; claim 5 is canceled; and claims 17-21 are new.

Status of Previous Rejections

The previous rejections of claims 1-3 and 11-12 under 35 U.S.C. 112, second paragraph as failing to have sufficient antecedent basis in the claims is withdrawn in view of the Applicant's amendments to the claims. The previous rejection of claims 1-9 and 11-15 under 35 U.S.C. 103(a) as being unpatentable over Beyer et al. (GB 1 482 724) is withdrawn in view of the Applicant's amendments to the claims. The previous rejection of claim 10 under 35 U.S.C. 103(a) as being unpatentable over Beyer et al. (GB 1 482 724), and further in view of the ASM Handbook Volume 4 is withdrawn in view of the Applicant's amendments to the claims. The previous rejection of claim 16 under 35 U.S.C. 103(a) as being unpatentable over Beyer et al. (GB 1 482 724), and further in view of the ASM Handbook Volume 4 is withdrawn in view of the Applicant's amendments to the claims. The previous rejection of claims 1-4 and 7-9 under 35 U.S.C. 103(a) as being unpatentable over Iwamoto et al. (JP 07-188847) is withdrawn in view of the Applicant's amendments to the claims. The previous rejection of claim 10 under 35 U.S.C. 103(a) as being unpatentable over Iwamoto et al. (JP 07-188847), and further in view of the ASM Handbook Volume 4 is withdrawn in view of the Applicant's amendments to the claims. The previous rejection of claims 11-15 under 35 U.S.C.

103(a) as being unpatentable over Iwamoto et al. (JP 07-188847), and further in view of Lee (US 2,014,440) is withdrawn in view of the Applicant's amendments to the claims. The previous rejection of claim 16 under 35 U.S.C. 103(a) as being unpatentable over Iwamoto et al. (JP 07-188847) in view of Lee (US 2,014,440), and further in view of the ASM Handbook Volume 4 is withdrawn in view of the Applicant's amendments to the claims.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1, 3-4 and 6-10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hayashi et al. (US 5,562,786) in view of Schladitz (US 3,343,953).

In regards to claim 1, Hayashi et al. ('786) disclose a sintered steel material comprising a composition as shown in the table below (col. 3, line 50 – col. 4, line 5).

Element	From Instant Claims (weight percent)	Hayashi et al. ('786) (weight percent)	Overlapping Range (weight percent)
C	0.4 – less than 1.3	0.20 – 1.6	0.4 – less than 1.3
Si	0.1 – 3.0	0 – 1	0.1 – 1.0
Mn	0.1 – 3.0	0 – 4	0.1 – 3.0
Cr	0 – 0.50	0 – 6	0 – 0.50
Ni	0.05 – 3.0	0 – 6	0.05 – 3.0
Al	0.7 – 2.0	0 – 2	0.7 – 2.0
Cu	0.05 – 3.0	0 – 4	0.05 – 3.0
Fe	remainder	remainder	remainder

Hayashi et al. ('786) further disclose up to 8 weight percent molybdenum, up to 2 weight percent tungsten, and up to 1 weight percent vanadium, which overlaps the range of a total amount of molybdenum, tungsten, and vanadium in an amount between 0.3 and 20 weight percent.

The Examiner notes that the composition disclosed by Hayashi et al. ('786) overlaps the composition of the instant invention, which is *prima facie* evidence of obviousness. MPEP 2144.05 I. It would have been obvious to one of ordinary skill in the art at the time the invention was made to select the claimed steel alloy composition from the steel alloy composition disclosed by Hayashi et al. ('786) because Hayashi et al. ('786) disclose the same utility throughout the disclosed ranges.

With respect to the limitation "wherein there can be observed graphite particles having an average particle size of not more than 3 μm in a section of a metal structure of a steel" of claim 1, the Examiner notes that Hayashi et al. ('786) disclose the use of graphite powder (Examples 1-2). However, Hayashi et al. ('786) do not specify the size of the graphite powder.

Schladitz ('953) discloses coating graphite with a capsule of metal such that the particles would have a thickness of a few microns to about 1 micron in order to lower material wear and prevent premature deformation (col. 1, lines 8-12, col. 1, lines 35-62, col. 2, lines 41-71, and claim 1).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to utilize the metal coated graphite particles having a thickness of a few microns to 1 micron, as disclosed by Schladitz ('953), while sintering

the steel material, as disclosed by Hayashi et al. ('786), in order to lower material wear and prevent premature deformation, as disclosed by Schladitz ('953) (col. 1, lines 8-12, col. 1, lines 35-62, col. 2, lines 41-71, and claim 1).

With respect to the recitation "for use as self-lubricating sliding parts", the Examiner notes that this recitation would not further limit the structure of the steel and therefore has been considered an intended use of the material. MPEP 2111.02 II.

In regards to claim 3, Hayashi et al. ('786) do not necessitate the addition of vanadium to the steel alloy because "up to 1 weight percent" would include 0 weight percent (col. 4, lines 1-5).

In regards to claim 4, Hayashi et al. ('786) disclose up to 8 weight percent molybdenum and up to 2 weight percent tungsten (col. 3, line 64 – col. 4, line 5), which overlaps the range of 0.3 to 5.0 weight percent of molybdenum and tungsten as claimed in the instant invention. Hayashi et al. ('786) do not necessitate the addition of vanadium to the steel alloy because "up to 1 weight percent" would include 0 weight percent (col. 4, lines 1-5).

In regards to claim 6, Hayashi et al. ('786) disclose up to 8 weight percent molybdenum (col. 3, line 64 – col. 4, line 5), which overlaps the range of 1.5 to 3.0 weight percent molybdenum.

In regards to claim 7, Hayashi et al. ('786) disclose up to 2 weight percent cobalt (col. 4, lines 1-5).

In regards to claims 8-9, Hayashi et al. ('786) do not necessitate the addition of sulfur or calcium. Hayashi et al. ('786) therefore meet the claim limitation of "not more

than 0.3% S" and "not more than 0.01% Ca" because "not more than" would include 0%.

In regards to claim 10, Hayashi et al. ('786) disclose subjecting the steel to a nitrogen gas atmosphere at elevated temperatures (nitriding) (Examples 1-2).

Claims 1- 4 and 7-10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kawabata et al. (JP 09-013142) in view of Iwamoto et al. (JP 07-188847).

In regards to claims 1, Kawabata et al. (JP '142) disclose a steel composition as shown in the table below (abstract and [0005]).

Element	From Instant Claims (weight percent)	Kawabata et al. (JP '142) (weight percent)	Overlapping Range (weight percent)
C	0.4 – less than 1.3	0.10 – 1.0	0.4 – 1.0
Si	0.1 – 3.0	0 – 3	0.1 – 3.0
Mn	0.1 – 3.0	0.05 – 0.3	0.1 – 0.3
Cr	0 – 0.50	0	0
Ni	0.05 – 3.0	0 – 3	0.05 – 3.0
Al	0.7 – 2.0	0 – 1	0.7 – 1
Cu	0.05 – 3.0	0 – 1	0.05 – 1
Fe	remainder	remainder	remainder

Kawabata et al. (JP '142) disclose a steel composition as shown in the table above, but Kawabata et al. (JP '142) do not specify wherein the steel material would contain 0.3 to 20 weight percent of molybdenum, tungsten, and vanadium.

Iwamoto et al. (JP '847), in the same field of endeavor (graphite-precipitated steels) disclose adding 0.05 to 0.50 weight percent molybdenum in order to improve hardenability [0029].

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to add 0.05 - 0.50 weight percent molybdenum, as disclosed by Iwamoto et al. (JP '847), to the steel material composition, as disclosed by

Kawabata et al. (JP '142), in order to improve hardenability, as disclosed by Iwamoto et al. (JP '847).

With respect to the limitation "wherein there can be observed graphite particles having an average particle size of not more than 3 μm in a section of a metal structure of a steel" of claim 1, Kawabata et al. (JP '142) disclose that the maximum diameter would be $\leq 5 \mu\text{m}$, which overlaps the range of "not more than 3 μm (abstract and Table 4).

With respect to the limitation "wherein the graphite particles observed in the section of the metal structure occupy an area rate of not less than 1% in the overall area of the section, and have an average particle size of not more than 3 μm " of claim 2, Kawabata et al. (JP '142) disclose rolling, quenching, and annealing at a temperature of 500-Ac₁ for 1 or more hours ([0021] and [0026]), which would be a process substantially similar to that of the instant invention. Therefore, the graphite particle area rate would be expected. MPEP 2112.01 I.

With respect to the recitation "for use as self-lubricating sliding parts", the Examiner notes that this recitation would not further limit the structure of the steel and therefore has been considered an intended use of the material. MPEP 2111.02 II.

In regards to claim 3, neither Kawabata et al. (JP '142) nor Iwamoto et al. (JP '847) necessitate the addition of vanadium.

In regards to claim 4, Iwamoto et al. (JP '847), in the same field of endeavor disclose adding 0.05 to 0.50 weight percent molybdenum in order to improve

hardenability [0029]. Neither Kawabata et al. (JP '142) nor Iwamoto et al. (JP '847) necessitate the addition of vanadium.

In regards to claim 7, Kawabata et al. (JP '142) do not necessitate the addition of cobalt to the steel alloy. Kawabata et al. (JP '142) therefore meet the claim limitation of "not more than 10% Co" because "not more than" would include 0%.

In regards to claim 8, Kawabata et al. (JP '142) disclose less than 0.3 weight percent sulfur (Table 4).

In regards to claim 9, Kawabata et al. (JP '142) do not necessitate the addition of calcium to the steel alloy. Kawabata et al. (JP '142) therefore meet the claim limitation of "not more than 0.01% Ca" because "not more than" would include 0%.

In regards to claim 10, Kawabata et al. (JP '142) disclose nitriding [0037].

With respect to the recitation "to use as sliding parts", the Examiner notes that this recitation would not further limit the structure of the steel and therefore has been considered an intended use of the material.

Claims 11-21 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kawabata et al. (JP 09-013142) in view of Iwamoto et al. (JP 07-188847), and further in view of Lee (US 2,014,440).

In regards to claims 11 and 19, Kawabata et al. (JP '142) disclose a steel composition as shown in the table below (abstract and [0005]).

Element	From Instant Claims (weight percent)	Kawabata et al. (JP '142) (weight percent)	Overlapping Range (weight percent)
C	0.4 – less than 1.3	0.10 – 1.0	0.4 – 1.0
Si	0.1 – 3.0	0 – 3	0.1 – 3.0
Mn	0.1 – 3.0	0.05 – 0.3	0.1 – 0.3
Cr	0 – 0.50	0	0

Art Unit: 1793

Ni	0.05 – 3.0	0 – 3	0.05 – 3.0
Al	0.7 – 2.0	0 – 1	0.7 – 1
Cu	0.05 – 3.0	0 – 1	0.05 – 1
Fe	remainder	remainder	remainder

Kawabata et al. (JP '142) disclose a steel composition as shown in the table above, but Kawabata et al. (JP '142) do not specify wherein the steel material would contain 0.3 to 20 weight percent of molybdenum, tungsten, and vanadium.

Iwamoto et al. (JP '847), in the same field of endeavor (graphite-precipitated steels) disclose adding 0.05 to 0.50 weight percent molybdenum in order to improve hardenability [0029].

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to add 0.05 - 0.50 weight percent molybdenum, as disclosed by Iwamoto et al. (JP '847), to the steel material composition, as disclosed by Kawabata et al. (JP '142), in order to improve hardenability, as disclosed by Iwamoto et al. (JP '847).

Still regarding claims 11 and 19, Kawabata et al. (JP '142) in view of Iwamoto et al. (JP '847) disclose a steel composition as shown above. However, Kawabata et al. (JP '142) in view of Iwamoto et al. (JP '847) do not specify that the composition would be used as a wire for piston rings.

Lee ('440) discloses wherein carbon steel containing 0.8 to 0.9 weight percent carbon would be preferred for piston rings (pg. 1, col. 1, line 1 - pg. 1, col. 2, line 10). Lee ('440) further discloses that rings having 0.8-0.9 weight percent carbon would perform satisfactorily with respect to elasticity, toughness, and high temperatures (pg. 1, col. 1, line 1 - pg. 1, col. 2, line 10).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the shape of the steel composition, as disclosed by Kawabata et al. (JP '142) in view of Iwamoto et al. (JP '847), into piston rings, as disclosed by Lee ('440), in order to produce piston rings that perform satisfactorily with respect to elasticity, toughness, and high temperatures (pg. 1, col. 1, line 1 - pg. 1, col. 2, line 10).

With respect to the limitation "wherein there can be observed graphite particles having an average particle size of not more than 3 μm in a section of a metal structure of a steel" of claim 1, Kawabata et al. (JP '142) disclose that the maximum diameter would be $\leq 5 \mu\text{m}$, which overlaps the range of "not more than 3 μm (abstract and Table 4).

With respect to the limitation "wherein sulfide inclusions observed in the section of the metal structure, being parallel to the periphery of the piston ring, are distributed such that straight lines each passing through a major axis of the respective sulfide inclusion cross one another within a cross angle of not more than 30 degrees which angle is referred to as a degree of parallelism" of claim 11 and "wherein graphite particles observed in the section of the metal structure occupy an area rate of not less than 1% in the overall area of the section and have an average particle size of not more than 3 μm " of claim 12, Kawabata et al. (JP '142) disclose that the maximum diameter would be $\leq 5 \mu\text{m}$, which overlaps the range of "not more than 3 μm (abstract and Table 4). Further, Kawabata et al. (JP '142) disclose rolling, quenching, and annealing at a temperature of 500-Ac₁ for 1 or more hours ([0021] and [0026]), which would be a

process substantially similar to that of the instant invention. Therefore, the graphite particle area rate and sulfide inclusion distribution would be expected. MPEP 2112.01 I.

In regards to claim 13, Kawabata et al. (JP '142) do not necessitate the addition of cobalt to the steel alloy. Kawabata et al. (JP '142) therefore meet the claim limitation of "not more than 10% Co" because "not more than" would include 0%.

In regards to claim 14, Kawabata et al. (JP '142) disclose less than 0.3 weight percent sulfur (Table 4).

In regards to claim 15, Kawabata et al. (JP '142) do not necessitate the addition of calcium to the steel alloy. Kawabata et al. (JP '142) therefore meet the claim limitation of "not more than 0.01% Ca" because "not more than" would include 0%.

In regards to claim 16, Kawabata et al. (JP '142) disclose nitriding [0037].

With respect to the recitation "wherein the steel has been forged drawn and/or rolled from an ingot" of claim 17 and "wherein the wire material has been annealed and subjected to quenching and tempering" of claim 18, the Examiner notes that the claims are drawn to a product and not a process. Even though product-by-process claims are limited by and defined by the process, determination of patentability is based on the product itself. The patentability of a product does not depend on its method of production. If the product in the product-by-process claim is the same as or obvious from a product of the prior art, the claim is unpatentable even though the prior product was made by a different process. MPEP 2113.

In regards to claims 18-21, Lee ('440) discloses forming piston rings from wire material (pg. 1, col. 1, line 1 - pg. 1, col. 2, line 10).

Response to Arguments

Applicant's arguments with respect to claims 1-4 and 6-21 have been considered but are moot in view of the new ground(s) of rejection.

Conclusion

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jessee Roe whose telephone number is (571) 272-5938. The examiner can normally be reached on Monday-Friday 7:30 AM - 4:30 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Dr. Roy V. King can be reached on (571) 272-1244. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Roy King/
Supervisory Patent Examiner, Art
Unit 1793

JR